

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of	)	
	)	
Biennial Regulatory Review – Amendments	)	WT Docket No. 06-156
to Streamline and Harmonize Various Rules	)	
Affecting Wireless Radio Services: Wireless	)	
Telecommunications Bureau	)	

**COMMENTS OF ERICSSON INC ON THE 2006 BIENNIAL REVIEW  
OF TELECOMMUNICATIONS REGULATIONS**

To: The Commission  
**Attention: Wireless Bureau**

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September 1, 2006

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**COMMENTS OF ERICSSON INC.**

**I. SUMMARY.**

Ericsson Inc (“Ericsson”) hereby submits comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) Public Notice (“Notice”), released August 10, 2006.<sup>1</sup> The Commission has asked for suggestions on rules that should be modified or repealed as part of its 2006 Biennial Review of regulations pursuant to Section 11 of the Communications Act of 1996.<sup>2</sup> Under Section 11, the Commission must review its regulations that are applicable to telecommunications service providers to determine whether any rule is “no longer necessary in the public interest as the result of meaningful economic competition.”<sup>3</sup>

The Commission is considering CTIA’s proposed industry-consensus changes to its Part 24 power limit rules in its 2004 Biennial Review that will encourage improvements in coverage, innovation and cost-effective deployment of wireless services.<sup>4</sup> CTIA asked that the Commission mirror these changes in its Part 27 rules to ensure technological neutrality and fair

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<sup>1</sup> See *Public Notice, The Commission Seeks Comment in the 2006 Biennial Regulatory Review of Telecommunications Regulations*, WT Docket No. 06-156 (Aug. 10, 2006) (“*Public Notice*”).

<sup>2</sup> See *id.* at 1.

<sup>3</sup> 47 U.S.C. § 161.

<sup>4</sup> See *Report and Order and Further Notice of Proposed Rulemaking, In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, 20 FCC Rcd. 13,900, 13,923-32 (2005) (“*FNPRM*”).

treatment of competing wireless carriers in the marketplace.<sup>5</sup> If the Commission does not adopt all these proposed changes in its 2004 review, it should continue to review them in its 2006 Biennial Review process. CTIA proposes the Commission modify Section 24.232 as follows:

- Add a power spectral density per-MHz limit to its rule and restructure the rule to allow measurements of equivalent isotropically radiated power (“EIRP”) limits under *either* the current per-carrier standard *or* under the power spectral density per-MHz limit;
- Set a sliding scale spectral density measurement that increases power limits, proportional to bandwidth; and
- Allow choice between using peak *or* average measurements for radiated power by eliminating the reference to “peak” measurements.<sup>6</sup>

Ericsson asks that the Commission continue to consider the Part 24 proposed rule changes in its 2006 Biennial Review. While it is considering these changes to Section 24.232, it should similarly modify Section 24.232(c), which establishes a peak measurement basis for mobile/portable stations (handset or terminal).

## **II. THE FCC SHOULD CONSIDER CTIA’S PROPOSED POWER LIMIT RULE CHANGES IN ITS 2006 BIENNIAL REVIEW.**

CTIA proposes three main changes to the current EIRP rule, 47 C.F.R. § 24.232. First, it adds a power spectral density feature to the rule that allows measurements of radiated power in amounts proportional to bandwidth, and permits carriers to use *either* the new power spectral density per-MHz measurement *or* its current per-carrier limits, so that neither technology is at a disadvantage. Second, it increases maximum EIRP limits for systems using power spectral density per-MHz measurements, using a sliding scale that permits use of higher power proportional to bandwidth. Third, CTIA proposes that the FCC measure all radiated power limits

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<sup>5</sup> See *id.* at 13,924-25. Ericsson supports mirroring these changes in the Part 27 rules for Advanced Wireless Services.

<sup>6</sup> See *Ex Parte* Submission of CTIA – The Wireless Association, *In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT Docket No. 03-264 (Feb. 7, 2005) (“CTIA Proposal”).

based on average power, to reflect current industry practices and standards.<sup>7</sup> The FCC should address each of these revisions in its 2006 Biennial Review process. For the same reasons, it should similarly revise its radiated power measurement methods for mobile portable stations (handsets or terminals) under Section 24.232(c) in this proceeding.

**A. Allowing Alternative Power Spectral Density Per-MHz and Per-Carrier EIRP Limits Will Ensure That the Rules Are Technologically Neutral.**

The FCC's current EIRP limit rule applies the same "per carrier" radiated power limit to both narrowband and broadband systems. In effect, the current rule limits broadband systems to about one-fifth of the radiated power per voice conversation that a conversation transmitted over a narrowband system may use.<sup>8</sup> CTIA's proposed revision removes the "artificial handicap"<sup>9</sup> against wideband technologies by adding a power spectral density limit and allowing users to choose *either* per-carrier *or* power spectral density per-MHz limits in measuring EIRP. CTIA's proposal places broadband and narrowband systems on even footing, consistent with the FCC's goal that its EIRP rules "neither penalize nor give advantage to any particular technology . . ."<sup>10</sup>

Both narrowband and wideband systems should not have to comply equally with a power spectral density radiated power limit because of differences in technologies. The industry generally agrees that modifying narrowband emissions limits strictly based on a power spectral density model and implementing varying limits for different narrow bandwidths could adversely impact these systems. While a power spectral density measurement works well for broadband technologies, mandating such a measurement uniformly across both narrowband and broadband technologies will impose overly strict limits on narrowband technologies and have substantial

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<sup>7</sup> See CTIA Proposal at 2-4.

<sup>8</sup> See Comments of Ericsson Inc., *In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, WT Docket No. 03-264 (Dec. 19, 2005) ("Ericsson Comments") at 10-13.

<sup>9</sup> CTIA Proposal at 2.

<sup>10</sup> *FNPRM* at 13,926.

negative impacts on the existing base of equipment. Nonetheless, as technology advances, narrowband systems may find the power spectral density limit to be a more efficient, effective way of delivering innovative services to consumers particularly in certain applications such as in rural areas.

By allowing a choice as to which EIRP limit entities may use, the Commission can provide industry greater flexibility to develop and deploy new technologies rather than attempt to predict the marketplace.

**B. Increasing Maximum Power Spectral Density Measurements Will Benefit Consumers.**

CTIA proposes that the Commission increase the maximum EIRP limits for systems using power spectral density measurements.<sup>11</sup> In that way, all technologies may increase their radiated power under the new power spectral density per-MHz measurements.

In the 2004 Biennial Review and other proceedings, parties have consistently recognized that increased power limits will improve service in both rural and urban areas and encourage development of improved technology, among other benefits.<sup>12</sup> EIRP limits dictate how systems are constructed. Under the constraints of these limits, a certain number of transmitter sites are installed to cover a particular area with an acceptable signal to noise ratio, and networks are fine tuned to provide the best possible coverage.

Increasing EIRP limits will provide additional flexibility by allowing more selectivity in site locations and fewer transmitters installations where use of higher power is feasible. In urban areas, higher EIRP limits will improve the indoor coverage, grade, and quality of service.

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<sup>11</sup> See CTIA Proposal at 2-4.

<sup>12</sup> See., e.g., Ericsson Comments at 3; Comments of Motorola, Inc., WT Docket No. 03-264 (Apr. 23, 2004) at 4; Comments of Qualcomm Incorporated, WT Docket No. 03-264 (Apr. 23, 2004) at 2, 8; Comments of Powerwave Technologies, Inc., WT Docket No. 03-264 (Apr. 23, 2004) at 6; and Comments of Cingular Wireless LLC, WT Docket No. 03-264 (Apr. 23, 2004) at 3-4.

Higher limits will also promote use of new technologies, such as higher gain antennas, and will encourage improvements in the design of subscriber products. Increasing these limits will encourage development of new technologies that may provide improved coverage efficiently without causing harmful interference to adjacent users. Higher power levels will meet the needs of both the industry and consumers in the current and future competitive marketplace by improving technology neutrality, encouraging innovation, and facilitating and promoting deployment of more efficient and effective wireless technologies.

Increasing EIRP limits will not lead to excessive radiated power causing harmful interference. Current industry practices, system operational characteristics, and existing emissions rules already constrain use of excessive power that may cause harmful interference. In order to operate at an aggregated radiated power level of 32,800 Watts, for example, a GSM system would have to use ten carriers in its bandwidth. Operationally, however, it is impossible to use such a high number of carriers in a contiguous 5 MHz bandwidth.

Additionally, existing protections for adjacent spectrum users practically limit systems' radiated power. The FCC's current rules regulate interference and emissions, and it is unnecessary for the FCC to perform the same task through a limit on radiated power. For example, the FCC already has rules in place that control interference where different frequency blocks are used within the same geographic area<sup>13</sup> and where the same frequency blocks are used in different geographic markets.<sup>14</sup> These and other rules effectively protect against harmful interference that could be caused by a system's operation at any power level.

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<sup>13</sup> See 47 C.F.R. § 24.238.

<sup>14</sup> See *id.* at § 24.236.

**C. The Commission Should Include Sliding Scale Power Limits.**

The Commission should include CTIA's proposed sliding scale power limits in its Biennial Review of this rule, because a sliding scale will provide flexibility for development of new technologies. Such a scale will not require modifications as "broader band" technologies emerge, and will encourage innovation. Moreover, while a sliding scale will theoretically allow higher EIRP levels, many operational and technical factors provide a practical cap to these levels. Thus, a sliding power limit scale will provide an optimal range of flexibility in which existing technologies may operate while still providing an optimal environment in which new technologies may emerge.

**D. Adopting Average Radiated Power Limits Will Ensure Consistency With Current Industry Measurement Procedures and Provide Regulatory Certainty.**

CTIA also proposed rule clarifications to eliminate references to measuring radiated power on a "peak" basis so that measurements may be made on either a "peak" or "average" basis.<sup>15</sup> By adopting average power as its measurement basis, the Commission will ensure that the radiated power limits specified in its rules are technologically neutral, consistent with prior official direction and industry standards, as well as harmonized with its measurement method for OOB.

First, the FCC has already interpreted its base station EIRP rule in practice to permit average power limit measurements. On March 10, 2004, the FCC confirmed in an email to the Swedish TCB that it allows average measurements to be "more fair" when measuring CDMA and broadband signals:

The "relaxation" for noise-like signal measurements is the allowance to use an Average detector instead of Peak or RMS detectors. Since the rules specify the peak power is the RMS equivalent power, we could force the use of only a RMS

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<sup>15</sup> Alternatively, the Commission could retain "peak" and add "average" as an alternative measurement basis.



or Peak detector for measurements. But instead, we allow an Average detector to be more fair when measuring CDMA and broadband signals, which would yield a lower power reading as compared to RMS or Peak detectors. This means that 100 watts measured with an Average detector for a CDMA signal may be 1000 watts peak power, but we would allow this to be approved.<sup>16</sup>

FCC staff also noted to Ericsson and the Swedish TCB that the Commission allows average detection as an alternative to peak measurements for measuring both transmitting carrier and out-of-band emissions.<sup>17</sup> Based on the FCC's clarification, many in the industry have correctly interpreted the rule to allow average measurement methods. By officially adopting that interpretation here, the FCC will provide industry with "regulatory certainty."

Moreover, by clarifying in its rules that industry may use average measurements to determine base station radiated power limits, the Commission will apply its regulations in a technologically-neutral manner. As the FCC noted in its 2004 Biennial Review *FNPRM*, wireless technologies have used frequency or phase modulation (FM or PM) to transmit analog voice and/or tone modulation for most of the last fifty years.<sup>18</sup> The emissions from these technologies have a "constant envelope" in which the peak power of emissions is equal to their average power, since there are no peaks or valleys in the envelope of the modulated waveform.

Some newer technologies, such as W-CDMA and CDMA 2000, produce an emission where the modulation envelope is not of constant amplitude, however. In these cases, an average measurement provides more accurate and relevant information on output, and a more accurate picture of power in the band. The peak measurement method only captures and represents power peaks that occur with low probability and for an extremely brief duration (sub-micro seconds).

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<sup>16</sup> See Attachment A, FCC email to Swedish TCB.

<sup>17</sup> See *id.*; see also 47 C.F.R. § 24.238. Achieving consistency in measuring transmitting carrier and out-of-band emissions is very important.

<sup>18</sup> See *FNPRM* at 13,931.

Thus, a peak measurement frequently artificially assigns a much higher power measurement in the band than levels typically observed during operation for these technologies.

Applying express “peak” language in the rule for non-constant envelope technologies like CDMA or W-CDMA would severely disadvantage these technologies. To comply with peak-measured limits, base station average output power would have to be decreased, reducing the coverage and capacity of networks significantly with no reports of interference. CDMA and W-CDMA networks would have to include new sites at additional expense to provide the same level of coverage and capacity that these technologies offer to the public today. With an average limit, however, the rule will apply fairly to all technologies in a manner that provides a more accurate picture of power in the band. An average power based rule will also apply neutrally to wireless systems, not placing systems that use network technologies like CDMA or W-CDMA at a competitive disadvantage. For these reasons, the Commission should eliminate the confusion in its power limit rules.

**E. The Commission Should Also Allow Average Measurements for Mobile/Portable Station Radiated Power Limits to Ensure Flexibility and Consistent Application of Its Rules.**

With its other power limit rule proposals, the FCC should include modifications to Section 24.232(c) to apply average measurements to mobile/portable station (handset or terminal) EIRP. It should revise these power limits for the same reasons as the base station rules.

The Commission’s PCS rules require industry to measure handset EIRP based on peak power measurements, in the same manner as its base station ERIP rules. Section 24.232(c) states:

Mobile/portable stations are limited to 2 watts e.i.r.p. *peak* power and the equipment must employ means to limit the power to the minimum necessary for successful communications.<sup>19</sup>

Measuring handset EIRP based on peak power does not present a fair or accurate picture of power in the band for these non-constant envelope technologies, placing them at an unfair competitive disadvantage. The FCC should permit average measurements of handset EIRP to ensure that its rules are technologically neutral and measure EIRP fairly for all technologies.

Permitting average measurements of handset EIRP will not lead to use of excessive power, causing harmful interference. Industry deploys handsets widely using non-constant envelope technologies today and, consistent with industry standards, measures EIRP limits based on average power without any reports of harmful interference. In practice, industry already minimizes handsets' PAR as much as possible. The FCC should modify the measurement basis for mobile units as well, to ensure technological neutrality, encourage innovation, and promote deployment of wireless technologies.

#### **IV. CONCLUSION.**

By adopting the proposed rule changes, the Commission will ensure that it adapts its power limit rules to current competitive market conditions. Specifically, the Commission should structure its power limits to permit choice between a new power spectral density per-MHz limit or its current per-carrier power limit, thus ensuring flexible treatment of current and future narrowband systems and no negative impacts on the competitive marketplace. It should increase radiated power limits measured using power spectral density per-MHz using a sliding scale that permits use of higher power in direct proportion to bandwidth because it will encourage industry to develop efficient and innovative technologies for the marketplace. Finally and very

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<sup>19</sup> 47 C.F.R. § 24.232(c) (emphasis added). At 47 C.F.R. § 27.50, the Commission's rules also prescribe peak EIRP limits for mobile and radiolocation mobile station transmissions.

importantly, by clarifying its rule to permit average power measurements for base stations, the Commission will conform its rule to official guidance already provided, as well as to current industry standards and practices. The rule is already applied in this manner to ensure that Commission rules do not disadvantage carriers in the marketplace that use non-constant envelope technologies like CDMA or W-CDMA in their service offerings.

In making this important clarification, the Commission should not be concerned that permitting average measurements will lead to harmful interference. Industry is already using average power measurements without any reports of interference. Interference is constrained in multiple effective ways – through other Commission rules that minimize interference, and through practical and operational considerations. Overall, it is in the public interest for industry to be able to use all the capacity of its spectrum. The clarification should also be applied, for the same reasons, to permit average measurements for mobile/portable stations.

Respectfully submitted this 1st day of September, 2006.

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## **ATTACHMENT A**

**Electronic Mail Messages Between The FCC and The  
Telecommunications Certification Body Clarifying  
That Average Measurements May Be Used Regarding  
The Power Limit in FCC Rule 24.232 Despite Use of  
“Peak” In the Rule**

## Tomas Bodeklint

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**Från:** Steven Dayhoff [Steven.Dayhoff@fcc.gov]  
**Skickat:** den 10 mars 2004 15:47  
**Till:** Tomas Bodeklint  
**Ämne:** RE: Question-Issue for March TCB conf.call

Hi Tom:

The "relaxation" for noise-like signal measurements is the allowance to use an Average detector instead of Peak or RMS detectors. Since the rules specify the peak power is the RMS equivalent power, we could force the use of only a RMS or Peak detector for measurements. But instead, we allow an Average detector to be more fair when measuring CDMA and broadband signals, which would yield a lower power reading as compared to RMS or Peak detectors. This means that 100 watts measured with an Average detector for a CDMA signal may be 1000 watts peak power, but we would allow this to be approved.

Regards,

Steve Dayhoff  
FCC

-----Original Message-----

**From:** Tomas Bodeklint [mailto:tomas.bodeklint@sp.se]  
**Sent:** Wednesday, March 10, 2004 9:12 AM  
**To:** Steven Dayhoff  
**Subject:** SV: Question-Issue for March TCB conf.call

Hi Steve

Thanks for the quick response. I appreciate that.  
I think the issue with out of band emission is clear now.

My clients do however push me on the peak power requirement in 24.232. They have a CDMA system and are concerned about this requirement.

As you know CDMA systems are "noise" like systems. The peak to average ratio for these types of system could sometimes be up to 10dB or more.  
If you look into the CCDF plots for these systems you can see that they only uses this peak power under very short period (for example 10-11 dB above average power during 0.0001% of the time).  
[I have enclosed some pages from the R&S and Agilent application notes which shows some typical CCDF plots for CDMA systems.]

The manufactures of these systems together with operators etc are always talking of average power when they referred to the power specification. This because it is more "real" or "usable" power in their perspective.

The concerns they have is that the requirements in 24.232 states that the peak output power shall not be more than 100 W (50dBm) and therefore with a peak to average ratio of 10dB they are limited to use only 10W(40dBm) Average output power.

**My question is if this requirement is absolute or if there is some interpretation that allows some relaxation for "noise" like systems as CDMA?**

My client is very urgent to know this answer and I would be grateful if you could send me some response on this.

Best regards

*Tomas Bodeklint*  
*Telecommunication Certification Body*

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**SP Swedish National Testing and Research Institute**

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Email: [tomas.bodeklint@sp.se](mailto:tomas.bodeklint@sp.se)

-----Ursprungligt meddelande-----

**Från:** Steven Dayhoff [mailto:Steven.Dayhoff@fcc.gov]

**Skickat:** den 9 mars 2004 20:13

**Till:** Tomas Bodeklint

**Kopia:** jallen@acil.org; Rich Fabina

**Ämne:** FW: Question-Issue for March TCB conf.call

Hi Tom and Janet:

The following Q & A is our most recent and final response to the issue stated in No. 2 of your email to Rich Fabina today, concerning average and peak measurements under Part 24E.

**Question:** Are average detectors still accepted for out of band (radiated) emission measurements for Part 22 and 24 devices?

1. The previous version of Part 24 (10-1-02 Edition) contained the following text related to the measurement of out of band emissions:

**24.238(d)** The measurements of emission power can be expressed in peak or average values provided they are expressed in the same parameters as the transmitter power.

2. The previous version of Part 22 (10-1-02 Edition) did not address the issue of the measurement detector specifically. However, in the 2000 Biennial Review of Part 22 the FCC proposed the following text:

**22.971(b) Measurement procedure.** Compliance with the limitation in paragraph (a) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or more. However, for measurements within 1 MHz of the center of the main emission bandwidth, a resolution bandwidth of not less than 1% of the main emission bandwidth may be employed. For the purpose of this section, the main emission bandwidth is the continuous width of the signal outside of which all emissions are attenuated by at least 26 dB below the transmitting power. Either peak or average measurements may be used, provided that both the emissions and the reference transmitter power are measured the same way. When measuring emissions, the transmitter must be set to operate as close to each of the upper and lower channel block edges as the design permits for normal operation.

This is consistent with the text contained within 24.238 in (1) above and is also consistent with the Commission's plan to provide more flexibility to licensees.

3. The Report and Order related to the 2000 Biennial Review was released Sept. 24, 2002 (FCC 02-229). Through the comments submitted by various parties and the discussion provided by the FCC, Part 22 and 24 were edited to be more consistent and streamlined. As part of this effort, it appears that the description of the measurement detector (peak or average) was deleted but there is no discussion of this point within the Report and Order. In particular, the newly adopted text in Part 24 no longer contains the text given in (1) above. Similarly, the text proposed by the FCC in (2) was not included in 22.917 as adopted in FCC 02-229. Thus, the current Part 22 and 24 rules (10-1-03

Edition) do not mention the measurement detector to be used for out of band emissions.

**Answer:** Yes average detector measurements for out of band emission measurements are still acceptable. Since the adoption of FCC Report & Order 02-229, which made changes to Section 24.238, there has been some doubt as to whether we still allow the use of average detectors when measuring out of band emissions and EIRP of the carrier as well. Although the statement "The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power." has been removed, we will still accept the use of average detectors, and also RMS or peak detectors, for making these measurements. Please keep in mind that Section 24.232(c) still requires peak power to be measured with instrumentation calibrated in terms of an RMS equivalent voltage.

Regards,  
Steve Dayhoff  
FCC

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**Tomas Bodeklint**

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**Från:** JAllen@ACIL.org

**Skickat:** den 15 mars 2004 17:45

**Ämne:** FW: FW: Question-Issue for March TCB conf.call

The following is sent to you at the request of Chris Harvey, TCB Council Secretariat.

..... Janet Allen

Janet S. Allen  
**Telecommunication Certification Body Council**  
c/o American Council of Independent Laboratories  
1629 K Street NW Suite 400  
Washington DC 20006  
Tel: 202-887-5872  
Fax: 202-887-0021  
[www.tbcbouncil.org](http://www.tbcbouncil.org)

-----Original Message-----

**From:** LabHelp [mailto:LabHelp@fcc.gov]

**Sent:** Monday, March 15, 2004 7:40 AM

**To:**

**Subject:** RE: FW: Question-Issue for March TCB conf.call

Answer:

Since the RFpower is to be calibrated in terms of an RMS voltage (24.232(c)), this means the proper method is to use an RMS detector. However, RMS detectors on Spectrum analyzers were rare in the past, and still are only provided on higher-end models. So we have compromised and allow an Average detector instead. Peak is also allowed if the device can comply. We must allow Average detect for every modulation type in general to be fair, however an RMS detector would be preferred. This policy also applies to Part 22H as well, although it is not in the 22H Rules.

Please respond to this further inquiry regarding the Pt.22/24 issue.

Further to your recent response regarding detector functions for Part 22/24 measurements, is the FCC policy of only allowing average power and spurious emission measurements on signals that employ a modulation format that varies in amplitude with time (e.g., CDMA), but requiring peak power and spurious emission measurements on signals that employ a modulation format that does not vary in amplitude with time (e.g., GSM) still in place?

2006-05-17